KING FAHD UNIVERSITY OF PETROLEUM & MINERALS
DEPARTMENT OF MATHEMATICS AND STATISTICS

STAT 201 INTRODUCTORY STATISTICS
Semester 181, Final Exam
Saturday Dec. 22, 2018

Serial Number

Name: _____ ID #:_____

Important Note:

- Formula sheet will be provided to you in exam. You are not allowed to bring, with you, formula sheet or any other printed/written paper.
- Mobiles are not allowed in exam. If you have your mobile with you, turn it off and put it under your seat so that it is visible to proctor.
- Show all your work including formulas, intermediate steps and final answer. No points for answer without justification.
- Round up to 4 decimal points if needed.
- Make sure you have 6 unique pages of exam paper (including this title page).

Question No	Full Marks	Marks Obtained
1	8	
2	8	
3	12	
4	8	
5	8	
6	12	
7	19	
Total	70	

Q1: The following table lists a measurement of the approximate annual rainfall (inches) for the last 10 years.

Year	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Annual rainfall	90	56	60	59	74	76	81	91	47	59

a. Estimate the average and the standard deviation for the annual rainfall (2 *pts.*)
b. Assume that the distribution of the rainfall normally distributed. Construct and interpret a 98% confidence interval to estimate the true population mean. (4 *pts.*)
c. If a forecaster claims that the annual rainfall is 78 inches. According to your answer in part b above, do you support his claim? (2 *pts.*)

Q2: In a sample of size 200 homes in Al-Khobar, it found that 50 has central AC unit.

a. Test the claim that the true proportion of homes that has central AC unit is less than 30%. (6 *pts.*)
b. With a 98% specified confidence level (reliability), determine the required sample size for estimating the population proportion, if the desired precision is ± 0.03. (2 *pts.*)

Q3:

A. The probability that Ali will get an offer on the first job he applies for is 0.5 and the probability that will get an offer on the second job he applies is 0.6. He thinks that the probability that he will get a offer on the both job is 0.15. What is the probability Ali gets an offer one at least one of the jobs he applies for? (4 *pts.*)

B. The length X in inches of a steel rod is a random variable with probability density function given by

$$f(x) = \frac{x-9}{2}, \quad 9 \le x \le 11$$

A rod is considered defective if the length is less than 10 inches. If 2 independent steel rods are examined, find the probability that exactly one defective. (4 *pts.*)

C. Suppose that a metal pin has a diameter that has a uniform distribution between 4.182 mm and 4.199 mm. If 15 such metal pins are selected, what is the probability that all of them will fit into holes that have diameter of 4.198 mm. (4 *pts.*)

Q4: National Parking Company (Mwaqif) claims that 40% of the parking spaces downtown are used by employees of the downtown businesses.

a. Find the probability that two or more of the spaces were filled by employees of the downtown businesses if a sample of size 7 parking spaces was selected randomly form the parking spaces. (3 *pts.*)
b. If a sample of size 120 parking spaces was selected. What is the approximate probability that the proportion of the downtown employees is at most 0.42? (5 *pts.*)

Q5: If a certain machine makes electrical resistors having mean resistance of 40 ohms and a standard deviation of 5 ohms.

a. If a resistor randomly selected, what is the probability that resistance of this unit is between 30 and 45 ohms. (3 *pts.*)
b. A random sample of 36 resistors is selected what is the probability that the combined (total) resistance of these 36 resistors is more than 1500 ohms? (5 *pts.*)

Q6: A Bank is interested to see whether there is a difference between average daily balances in checking accounts that are joint accounts (two or more members per account) versus single accounts (one member per account). A random sample of checking accounts was selected with the following results:

Single Accounts	Joint Accounts
n1 = 20	n2 = 25
s1 = $256	s2 = $300
$\bar{x}_1$= $1,123	$\bar{x}_2$ = $1,245

a. They believe that the joint account has larger average daily balance, use 5% level of significance to test this hypothesis. (10 *pts.*)

b. Find the p – value of the test (2 *pts.*)

Q7: The electric power consumed each month by a chemical plant is thought to related to the average ambient temperature. Summary quantities were

$$n = 20, \sum x_i = 690,\ \sum y_i = 3330,\ \sum x_i^2 = 43650,\ \sum y_i^2 = 930510,\ \sum x_i y_i = 195510$$

a. Predict the power consumption when the temperature is 40 ^{o}C. (4 *pts.*)
b. Find the percentage of the variation in the power consumption that can be explained by the variation from the temperature. (2 *pts.*)
c. Find the estimated error variance. (2 *pts.*)
d. Test the hypothesis that the higher the temperature, the more is the power consumption, use α = 0.05. (7 *pts.*)
e. Compute a 95% confidence interval estimate of the average power consumption when the temperature is 40 ^{o}C. (4 *pts.*)